Submission to the Queensland Flood and Cyclone Inquiry

The YellowBird ALERT System

Stephen Robson, David Templeman, Brian Flanagan, and Ross Holmes

March 2011

Background

The recent series of large scale natural disasters affecting Queensland, and indeed the disasters elsewhere across Australia and New Zealand, have clearly demonstrated the requirement for robust and reliable communication systems. There is a need for emergency warning in the lead up to such disasters, and also for both warnings and community information during disasters, and in the recovery phase.

The *National Framework for Scaled Advice and Warnings to the Community*, under the banner of '*Prepare. Act. Survive*' emphasises the value of preparedness, and the use of **multiple methods** of warning dissemination to communities.

During the lead up, emergency service agencies will specifically construct messages (using the OASIS common alerting protocol [CAP] standard) and disseminate these through radio as part of a multi-channel approach, including television and print media.

The Recovery Task Force for *Cyclone Larry* encountered massive yet predictable problems with communications. In *The final report of the Operational Recovery Task Force: Severe Tropical Cyclone Larry*. (Cosgrove P, *et al*. State of Queensland [Department of the Premier and Cabinet], Brisbane, 2007), the following observations were made:

> "Disruption of the normal communications channels and sources of information for people is one of the first impacts in most natural disasters ...

> "The immediate (and it might be said in many disasters, inevitable) loss of mains power means that the instant, pervasive reach of the mass media falls away sharply – not even the ubiquitous World Wide Web will work.

> "In this regard, contingency plans for post-disaster communications have to focus even more clearly on redundant means of transmitting and receiving vital information. This is important from several points of view – the safety of life and limb, directing relief efforts by broadcast, and helping maintain and restore public confidence in the disaster area and preventing panic.

> "In the case of Larry, not enough people had heeded the advice to have battery-operated radios on hand. Televisions, phones and the Internet were down because of the lack of

power and many people observed to the Task Force that, in among all their wants and needs, **this lack of broadcast information was the most disconcerting**."

Subsequent recommendations contained in the Cosgrove Report include the following:

Recommendation 4

That consideration be given to additional ways and means to improve broadcast capability into disaster-affected regions, particularly for the early aftermath of any disaster when a loss of power characterises the event.

"... while radio networks, especially the ABC provided great public service by their emergency information broadcasts, experience shows that this information may need to be broadcast exclusively and repetitively for days and even weeks. In this regard, it would be useful to consider emulation a system used in other countries, namely the availability of specific, 'emergency-only' radio broadcast frequencies in disaster-prone areas, to be activated and operated where necessary as an adjunct to normal broadcasting."

Recommendation 6

An early and high priority task in recovery from a natural disaster should be the development of a co-ordinated, succinct, practical and flexible public communications plan.

The current status of warning and post-disaster communications systems

"Major emergencies are an unfortunate fact of life and come in many forms or types of hazard...The way we prepare for these events can make the difference between them being an emergency that is managed without unnecessary loss, or a disaster that has catastrophic effects on life..."

"History shows that to minimise the occurrence and impact of emergencies, we need to remove the common elements of disasters by acknowledging:

The **inevitability** of very severe events.

That **prepared communities** are less likely to suffer the consequences of catastrophic disasters."

Emergencies and the National Capital –
A Residents' guide

Guides to disaster preparedness, such as that issued by the ACT Emergency Services Authority, invariably give the following advice:

> "**A battery-operated radio is the most reliable way to receive information if the power fails**."

All mainland states and territories except Western Australia have contracted to use the NEWS (National Emergency Warning System) alert. Western Australia uses the locally-developed State Alert system. These employ text messages and telephone calls *via* mobile and fixed line.

There are a number of important disadvantages of the NEWS Alert system that have severely compromised its value in rapidly-evolving large scale disasters, such as those that have affected Queensland.

1. **It relies entirely upon intact infrastructure, in particular power and mobile phone towers.**

2. **It is extremely reliant on complex computing resources.**

3. As the disasters in Queensland, and indeed the Christchurch earthquake disasters have demonstrated, **the mobile phone network is usually the first to fail. Even when there is partial service, the system is overloaded and fails quickly. Thus, initial warnings may be issued the follow-up warnings after the initial disaster often cannot be issued.** As media coverage of the Christchurch disaster revealed:

   a. "Civil Defence officials have asked residents not to flush their toilets, to use water sparingly, **<u>not to use their telephones</u>**, check on their neighbours, and to stay away from damaged areas while authorities work to restore services and assess buildings."

   b. "...the message spread that **batteries in cell towers were running low and mobile phone use should be minimised. National Radio should be commended for providing an excellent service, if only most people had a radio with batteries still!**"

4. **In the current iteration, messaging to mobile phones depends upon the billing address of the subscriber**. A $40 million roll-out of location-aware systems has been approved.

5. The NEWS Alert system usually instructs warning recipients to turn on and monitor their radios.

6. There are large ongoing costs of maintaining the system and issuing warnings.

7. Mobile phone handsets may be switched off, or the intended recipients simply ignore the text messages or don't hear them.

The YellowBird ALERT

The YellowBird ALERT (Automatic Linking to Emergency Radio Transmissions) has been developed work as part of a **national systems approach to community warning** and to build **community resilience**.

The YellowBird ALERT system can be summarised as follows:

- It is a simple and reliable method of using the existing radio broadcast infrastructure to remotely switch on radios, in the event of emergency warnings (for example, tsunami, cyclone or storm, flood, bushfire, terrorist alert, traffic hazards, or multiple 'all-hazards' uses).

- The triggering software system is simple, and in final form could easily be run by emergency services from a laptop computer, iPhone, BlackBerry or other mobile device.

- The simplicity of the YellowBird system makes it almost uniquely resilient and largely invulnerable to infrastructure failures (power failure, telephone network failures, Internet failure) and deliberate sabotage (industrial or military 'hacking,' viruses and assaults such as the 'Stuxnet worm.')

- The system would be uniquely applicable to mobile telephones and mobile devices, and by using radio would totally bypass the need for an intact Internet and mobile phone tower systems. It could interrogate the GPS device in the phone, and use the phone's radio reception.

ABC radio, and selected commercial broadcasters, works with emergency services to issue emergency warnings. **However, radio warnings may be missed if the radio is switched off, especially if people are asleep. People may also be trying to preserve battery power**.

The YellowBird ALERT system is unique in that it allows emergency authorities and radio stations to **selectively** switch on radios precisely in vulnerable areas, to ensure that emergency warnings are not missed.

Even when switched off, the YellowBird ALERT chip is regularly checking for a triggering tone. If the tone is detected, the chip 'listens' for a brief datastream specifying the boundaries of the 'risk polygon.' The chip interrogates a GPS chip, and if it is located within the risk polygon, it launches **a loud siren and flashing light before activating the radio, so that anybody nearby can hear the warning.**

How does the YellowBird ALERT work for Emergency Services personnel?

1. Emergency Services personnel determine that radio warnings are to be issued, typically with SEWS preceding the warning message, according to standard protocols.

2. A 'risk polygon' is drawn. This may be on the YellowBird ALERT software, but would be equally applicable and could be drawn from National telephone Alert software or StateAlert mapping.

3. The datastream specifying the boundaries of the 'risk polygon' are either downloaded by the radio station, or faxed, or telephoned. The method used would be individually determined by Emergency Services and local radio stations.

4. Before issuing the on-air warnings, the radio station plays the triggering tone then the datastream.

5. YellowBird radios within the risk polygon emit a loud siren and flashing light to attract attention before the radio itself switches on.

Advantages of the YellowBird ALERT system over existing communications

- Instantaneous alerts can be issued with extreme precision, from single house, street, or location, to an entire country, instantly.

- Radio infrastructure is extremely reliable, and is rarely affected by the infrastructure disruptions that characterise natural, and indeed other, disasters.

- There is no computing cost or complexity whatsoever.

- The radios work when virtually all other communications have failed.

- There is no cost to Governments or Emergency Services to install and maintain the system, and there is no cost to send messages.

- Existing warning messaging protocols do not need to be changed.

- There is no reliance on intact power supplies or mobile telephone infrastructures.

- There should be compatability with existing alert systems where a risk polygon is drawn.

- Cover of vulnerable areas is generally better with radio than all other methods of warning dissemination.

- The system can be used to cheaply provide messaging during recovery and relief operation after a disaster, when infrastructure has been damaged but emergency communications are desired.

- The YellowBird system is highly regarded by Vision Australia, as an excellent system for visually and hearing impaired, and those with conditions such as arthritis were hand use is limited.

Who has developed the YellowBird ALERT system?

The system was invented by Associate Professor Stephen Robson of the Australian National University Medical School, after his experiences in the 2003 Canberra bushfires. Further development has been undertaken with the assistance of Mr David Templeman, Director General of Emergency Management Australia (EMA) 2000-6. Also involved have been Mr Brian Flanagan (EMA, 1999-2006) and Mr Ross Holmes (former District Emergency Management Officer, NSW Police, Monaro Region). All technical development has been performed by LX Innovations (Sydney, NSW) and Design Momentum (Sydney, NSW).

Support for the YellowBird ALERT system

The system has written support for trials from emergency services authorities within Australia and overseas. The system has been demonstrated to, and received approval from:

The NSW Fire Commissioner
ACT Emergency Services Authority
AFAC (the Australian Fire and Emergency Service Authorities Commission)
WA Emergency Services (FESA)
SA Emergency Services (SAFECOM)

There is strong support from ABC Radio for trials of the system, as well as the NGOs *Oxfam*, *Caritas* and *Vision Australia.*

The system won the Insurance Council of Australia's annual national Resilience Award for 2010.

Conclusion

The YellowBird ALERT is a low-cost, technically simple system which can readily enhance national warning capability with minimal cost. Lessons from the experience with *Cyclone Larry* emphasise the benefits of improving the versatility of radio application in relation to warning communities in both a pre- and post-disaster setting.